

## ULTRASONIC PEST REPELLER

This is a complete application claiming benefit of provisional application Serial No. 60/462,290 filed April 14, 2003.

### 5 BACKGROUND OF THE INVENTION

#### Technical Field

This invention relates to pest repellers, and relates more particularly to devices for broadcasting electronically-generated ultrasonic sound waves at a high volume to repel household pests, particularly rodents.

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#### Discussion of the Prior Art

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Household pests, such as mice, rats and the like, are a common problem, both domestically and commercially. Attempts to deal with the nuisance caused by these pests include the use of snap-traps that, unless located in protected areas can be harmful to children and pets, and insecticides, both liquid and powder, some of which include dangerous poisons. Notwithstanding these age-old solutions, mice and rats continue to multiply and thrive.

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Rather than capturing or killing rodents, products have been marketed which simply repel these pests, causing them to avoid or leave areas that might otherwise attract them, such as kitchen cupboards, pantries or basements. Commercially available ultrasound transmitters emit sound waves with frequencies generally too high to be heard by the human ear, but high enough to annoy or repel rodents, directing them away from areas which they tend to frequent, and possibly toward areas where they can more readily and safely be trapped or otherwise eliminated.

Ultrasonic sound is highly directional and will be reflected by hard surfaces. Ultrasonic sound waves act more like light than sound from a radio. The waves travel from a transducer in a cone-like shape and leave “shadows” behind objects in their path, such as furniture, curtains or the like. The shadows are areas of non-coverage.

5           Products currently in the market are of two general styles, “direct plug-in” and “table top”. The cone-shape emitted from the transducer covers approximately 120°. The direct plug-ins are limited in their useful coverage area because of the fixed relationship between the electrical connection used to power the unit from household current, and the sound producing transducers. Effectively, the useful coverage is dictated by the location of the wall outlet and the existing objects in the room.

10           The table top versions contain an electrical cord and plug and, inherently, have more potential for useful coverage because they can be positioned by the consumer to avoid obstructions that may be present if the unit is plugged directly into a wall outlet.

          Dual transducer (speaker) units have been marketed to further increase the useful coverage in both direct plug-in and table top models. These units employ two positionally fixed, side-by-side, 15           transducers positioned generally at about 30° from each other. Such units provide, effectively, 150° of coverage since the areas of overlap have no more effective sound than a single covered area because the amplitude or volume properties, measured in decibels, of the sound waves are not additive. Thus, the net effect of adding the second fixed transducer to the unit is only, on the order, of about 30° of extra coverage.

20           It would be highly desirable to provide an ultrasonic pest repeller having substantially increased coverage potential without taking up significantly more room, and with little or no additional cost.

## OBJECTS AND SUMMARY OF THE INVENTION

It is, therefore, a principal object of this invention to provide an ultrasonic pest repeller which permits the consumer to adjust the radial position of two or more speakers relative to each other in a manner which allows infinite separation between the transducers thereby expanding the effective repelling zone significantly over the single, or positionally-fixed, multiple products currently in the market.

Another object of this invention is to provide an embodiment of an ultrasonic rodent repeller, whether of a direct plug-in or table top version, wherein either one speaker can be fixed, and the second speaker rotatably-positioned on the top of the fixed speaker, or an even further improved embodiment wherein both speakers are rotationally-mounted about a single base or support. With the use of the single rotationally-mounted embodiment, the upper speaker can be rotated to be offset up to  $90^\circ$  in either direction from the lower speaker providing a maximum potential of  $210^\circ$  coverage (when the speakers are offset  $90^\circ$  from each other). With an embodiment wherein two speakers are rotatably-mounted with respect to a fixed base, a total coverage of  $240^\circ$  is possible if the speakers are offset from  $120^\circ$ - $180^\circ$  with respect to each other.

Yet a further object of this invention is to provide an ultrasonic rodent repeller comprising at least two transducers rotatably-mounted vertically with respect to each other to emit ultrasonic sound waves over a large area in a simple and inexpensive manner, offering greater versatility since the consumer can position the speakers relative to each other in a manner to minimize shadows or areas of non-coverage.

A still further object of this invention is to provide a multiple speaker pest repeller of the plug-in or table top version that can be powered from any standard wall outlet, operated inexpensively, will not interfere with radio or television sets, electrical appliances, garage door openers or pacemakers, and yet

will broadcast an acoustically hostile environment to targeted pests which is harmless to humans, most domestic pets (although it may be annoying to hamsters, gerbils, guinea pigs and rabbits), farm animals, birds or fish.

5 Yet another object of this invention is to provide a highly versatile, multiple speaker, rodent repeller that can be effectively combined with other pest control methods to help drive the targeted pets toward safely-placed traps or poisoned bait which may be outside the ultrasonically-protected area, resulting in a more rapid eradication.

10 Yet another object of this invention is the provision of a simple snap and lock mechanism between a base element and a vertical stem, with at least two ultrasonic transmitters rotatably-mounted on the stem for infinite adjustment relative to each other.

Upon further study of the specification, additional objects and advantages of this invention will become apparent to those skilled in the art.

#### BRIEF DESCRIPTION OF THE DRAWINGS

15 These and other objects, features and many of the attendant advantages of this invention will be better understood by those with ordinary skill in the art in connection with the following detailed description of the preferred embodiments and the accompanying drawings wherein:

Like reference characters refer to like parts throughout the several views of the drawings.

20 Figure 1 is a front elevational view of a first embodiment of a dual unit, ultrasonic pest repeller with the cover removed from the lower or fixed unit;

Figure 2 is a view similar to Figure 1, with the upper unit rotated in a 90° direction to the right;

Figure 3 is a view similar to Figure 1, with the upper unit rotated in a 90° direction to the left;

Figure 4 is a front elevational view of a preferred embodiment of a dual unit, ultrasonic pest repeller according to the instant invention with the cover of both the upper and lower speakers removed;

Figure 5 is a view of the device of Figure 4 with the covers replaced and with the upper unit rotated 90° to the left;

Figure 6 is a view similar to Figure 5 with the lower unit rotated 90° to the right;

Figure 7 is a partially exploded perspective view of the dual unit, ultrasonic pest repeller of Figures 4-6 illustrating the manner in which the vertical stem carrying the speakers would be seated in a base assembly;

Figure 8 is an enlarged perspective view showing the locking ribs on the vertical stem adapted to interengage in the base unit;

Figure 9 is an enlarged schematic cross-sectional view through a portion of the dual unit, ultrasonic pest repeller shown in Figure 7 illustrating the “snap-joint” between the vertical stem and the base unit;

Figure 10 is an exploded schematic view showing the elements forming the speaker assemblies of the preferred embodiment of this invention; and

Figure 11 is an exploded view showing the elements forming the base unit adapted to receive the vertical stem of the speaker assembly.

Like reference characters refer to like parts throughout the several views of the drawings.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The foregoing descriptions and drawings should be considered as illustrative only of the principles of the invention. Numerous applications of the present invention will readily occur to those

skilled in the art. Therefore, it is not desired to limit the invention to the preferred embodiments or the exact construction and operation of the preferred apparatus shown and described. Rather, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

Referring now to Figures 1-3, a first embodiment of a dual speaker pest repeller according to the instant inventive concepts is designated generally by the reference numeral 20 and comprises a lower, fixed speaker 25 (shown with the cover removed for illustrative clarity) having a downwardly depending stem 26, and a rotatably-supported, upper speaker 35 having a downwardly depending stem 36. The base for this unit is not shown, but will be similar to that discussed below with respect to the second embodiment of this invention and may include a "snap-joint" support for the stem 26 of the lower speaker unit 25. A wire from a power unit (not shown in this embodiment) may pass through the hollow stem 26 to be electrically connected to the transducer (not shown) of the lower speaker unit 25 and may then pass through the rotatably-supported hollow stem 36 of the upper speaker unit 35 to power the transducer therein. The electrical connections are well within the skill of the art.

As seen in Figures 1-3, the stem 36 of the upper speaker unit 35 is seated in a saddle 28 carried by the back 30 of the lower speaker unit 25 for rotation with respect thereto. A stop 38 carried on the stem 36 of the upper speaker unit 35 limits the rotation of the upper speaker unit 35 with respect to the lower speaker unit 25 to 90° in either direction as seen, respectively, in Figures 2 and 3.

Even with the embodiment of Figures 1-3 wherein the lower speaker unit 25 is fixed relative to a base, a maximum potential of 210° coverage, when the speakers are offset 90° from each other as seen in Figures 2 and 3, is possible, in contrast with the 150° coverage afforded by the side-by-side, fixed speaker units currently in the market.

With reference, however, to Figures 4-11, a preferred embodiment of the instant inventive concepts can be seen at 40, wherein both the lower and upper speaker units, 45, 60, are rotationally

carried on a single stem 70, having locking ribs 72 on its lower surface as seen particularly in Figure 9, adapted to be engaged, as by snap-joint 74 seen particularly in Figure 8, in a base element 90. With this embodiment, the stem 70 passes through saddles 46 and 61 on the lower and upper speaker units 45, 60, respectively, so that each unit can rotate relative to the stem 70 as seen, for example, in Figures 5 and 6 wherein the transducers of the speaker units can be offset from each other by as much as 180° (note Figure 6). In this manner, a full 240° of coverage is possible.

Technically, the same concepts can be used to rotationally mount three speaker units relative to each to provide a full 360° coverage.

The specific physical constructional details of each of the speaker units for either of the embodiments of this invention are not critical to the instant inventive concepts and, in many respects, are quite similar to prior art ultrasound units. For example, with reference to Figure 10, each of the speaker units or “eyeball assemblies” 45, 60 will include front housing elements 48, 62 and back housing elements 50, 64, a metal grill 50, 66, a buzzer 52, 67 and a buzzer housing 54, 68, respectively. The stem 70 can be formed from two elements 70a, 70b to facilitate assembly.

As seen in Figure 11, the base unit 90 may comprise a base plate 92 which may be supported on rubber feet 94, a sheet of insulation 96, a main PCB assembly 98, which is conventional, with a power cord 100 and a base cover 102.

Each of the speaker units commonly beam a barrage of ultrasonic waves in excess of 130dB while pulsing in a frequency range of 32 kHz to 62 kHz, although the sound waves may be adjusted, as necessary, to repel selected pests without annoying humans.

Considering the foregoing, it will now be seen that there is herein provided multiple-speaker pest repellents which meet all of the objects of the instant invention, and others, including many advantages of great commercial potential.

The foregoing descriptions and drawings should be considered as illustrative only of the principles of the invention. As noted, the invention may be configured in a variety of shapes and sizes and is not limited by the dimensions of the preferred embodiment. Numerous applications of the present invention will readily occur to those skilled in the art. Therefore, it is not desired to limit the  
5 invention to the preferred embodiments or the exact construction and operation shown and described. Rather, all suitable modifications and equivalents may be resorted to falling within the scope of the invention.